

**Response Under 37 C.F.R. 1.116**

Applicant: Jeffery Davis et al.

Serial No.: 09/931,987

Filed: August 17, 2001

Docket No.: 10010715-1

Title: ONE CHIP USB OPTICAL MOUSE SENSOR SOLUTION

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**REMARKS**

This Amendment is responsive to the Office Action mailed February 10, 2004. In that Office Action, the Examiner rejected claims 1-5, 8-13, 15-19, and 21-22 under 35 U.S.C. §103(a) as being unpatentable over Williams et al., U.S. Patent No. 4,751,505 (“Williams”) in view of Piot et al., U.S. Patent No. 6,256,016 (“Piot”). Claims 6, 7, 14, and 20 were rejected under 35 U.S.C. §103(a) as being unpatentable over Williams in view of Piot as applied to claims 1, 10, and 16 above, and further in view of Siddiqui, U.S. Patent No. 5,912,661 (“Siddiqui”).

With this Response, the Applicant respectfully traverses the Examiner’s rejection of claims 1-22. Claims 1-22 remain pending in the application and are presented for reconsideration and allowance.

**Claim Rejections under 35 U.S.C. §103**

The Examiner rejected claims 1-5, 8-13, 15-19, 21, and 22 under 35 U.S.C. §103(a) as being unpatentable over Williams et al., U.S. Patent No. 4,751,505 (“Williams”) in view of Piot et al., U.S. Patent No. 6,256,016 (“Piot”).

Independent claim 1 includes the limitation “a single chip for receiving the reflected images, generating digital representations of the reflected images, generating a first set of movement data based on the digital representations of the reflected images, the first set of movement data indicative of relative motion between the chip and the imaging surface, the single chip including a serial interface for outputting motion data in a serial format based on the movement data.” The Examiner stated that “[t]he only thing Williams does not show is a serial interface included in the single chip.” (Final Office Action at para. no. 4, page 3). The Examiner also stated that:

In the same field of endeavor, Piot teaches that the microcontroller (650) is also coupled to the line interface 660 . . . the output from the line interface 660 is a standard communication, such as a serial port communication protocol; see column 13, lines 41-54. Piot also teaches that microcontroller (650) can be integrated by different modules such 620, 625 (see column 13, lines 45-54). Thus it would have been obvious that the microcontroller (650) can be integrated with the serial interface protocol (660) so as to reduce the size of the input device. Therefore, it would have been obvious to one of ordinary skill in the art at the invention was made to have added a serial interface as

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taught by Piot to the integrated circuit of Williams so that the size of the input device can be reduced. (Final Office Action at para. no. 4, page 3).

The Federal Circuit has stated, “[i]n holding an invention obvious in view of a combination of references, there must be some suggestion, motivation, or teaching in the prior art that would have led a person of ordinary skill in the art to select the references and combine them in the way that would produce the claimed invention.” *Karsten Manufacturing Corp. v. Cleveland Golf Co.*, 58 U.S.P.Q.2d 1286, 1293 (CAFC 2001). There is no suggestion in Williams or Piot to combine the cited references in any way, let alone in a way that would produce the claimed invention. Williams and Piot disclose different types of devices that rely on different processing techniques. The optical mouse disclosed in Williams requires that it be used in conjunction with a special patterned mouse pad. (See, e.g., Williams at col. 2, lines 3-5; and col. 2, lines 59-61). In contrast, the optical detection system disclosed in Piot generates speckle images from a scattered collimated beam, and Piot indicates that “[t]he system works with any surface that can diffusely scatter a collimated beam.” (See, e.g., Piot at Abstract).

Furthermore, Williams includes no teaching or suggestion that the optical mouse disclosed therein could or should be modified to include a serial interface anywhere within the mouse, let alone that a serial interface could or should be incorporated into the integrated circuit 124. Piot includes no teaching or suggestion that the line interface 660 could or should be incorporated into the same integrated circuit as microcontroller 650 and/or other circuitry, such as the photosensor arrays 320, or cross-correlation modules 620 and 625. Rather, Piot discloses that: “It is noted that the photosensor arrays 320, microcontroller 650, and cross-correlation modules 620, 625 may be integrated on a single complementary metal oxide semiconductor integrated circuit using a conventional digital signal processing (“DSP”) core. In an alternative embodiment, these elements may be built using discrete integrated circuits such as a microcontroller or DSP chips, for example.” (Piot at Col. 13, lines 46-53). Piot includes no teaching or suggestion that the line interface 660 might also be incorporated into this single CMOS integrated circuit. Even if Williams and Piot were combined, which there is no suggestion to do, and the line interface 660 of Piot were incorporated into the optical mouse disclosed in Williams, as suggested by the Examiner, the teachings of Piot

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indicate that the line interface 660 would not be incorporated into a common integrated circuit with other elements of the mouse. Thus, the combination of Williams and Piot does not teach or suggest each and every limitation of claim 1.

In addition to not including any teaching or suggestion regarding a serial interface, which has been acknowledged by the Examiner, Williams also does not teach or suggest that the integrated circuit 124 generates digital representations of reflected images as recited in claim 1. Similarly, Piot indicates that the data signals from photosensor arrays 320a and 320b can be converted into digital values, but does not teach or suggest incorporating an analog-to-digital converter into an integrated circuit, such as the integrated circuit disclosed in Williams.

In view of the above, independent claim 1 is not taught or suggested by Williams and Piot, either alone, or in combination. The Applicant respectfully traverses the rejection of claim 1, and reconsideration and allowance of claim 1 is respectfully requested.

Dependent claims 2-5, 8, and 9, further limit patentably distinct claim 1, and are believed to be allowable over the cited references. In addition, dependent claims 2-5, 8, and 9, are further distinguishable over the cited references. For example, claim 4 includes the limitation "wherein the single chip is configured to receive button press information identifying a button that has been pressed on the apparatus." Claim 5 is dependent on claim 4 and includes the limitation "wherein the single chip is configured to output the button press information in a serial format through the serial interface." With respect to claims 4 and 5, the Examiner stated that "Williams clearly teaches the button (116, 114) connected to the integrated circuit (124). Thus, combining Williams and Piot would met (sic) the cliaeemd (sic) limitation." (Final Office Action at para. no. 4, page 4). Figure 3 of Williams appears to show that both the microswitch 114 and the integrated circuit 124 are connected to the printed wiring board 118. However, there is no teaching or suggestion in Williams that the microswitch 114 and the integrated circuit 124 are electrically connected together, such as through traces in the printed wiring board 118. There is no teaching or suggestion in Williams that the integrated circuit 124 is configured to receive button press information as recited in claim 4, or output button press information as recited in claim 5. Piot also includes no teaching or suggestion regarding a chip that receives button press information as recited in

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claim 4, or outputs button press information as recited in claim 5. Thus, Williams and Piot, either alone or in combination, do not teach or suggest the limitations of claims 4 and 5.

Claim 8 includes the limitation “wherein the serial interface is configured to be coupled to a host device, and wherein the single chip is configured to provide testing information about the chip to the host device through the serial interface.” Claim 9 includes the limitation “wherein the single chip is configured to receive orientation information indicating a mounting orientation of the single chip.” The Examiner stated that “[a]s to claims 8-9 and 22, since the microcontroller of Piot can be programmable. Thus, the microcontroller of Piot can provide test information as recited in claim 8 and configure (sic) to receive orientation information indicating a mounting orientation of the chip as recited in claim 9.” (Final Office Action at para. no. 4, page 4). There is no teaching or suggestion in Piot that the microcontroller is programmed to provide testing information as recited in claim 8, or receive orientation information as recited in claim 9. The Examiner has not provided any specific citation in either Williams or Piot that teaches or suggests a chip that is configured to provide testing information as recited in claim 8, or receive orientation information as recited in claim 9. Williams and Piot, either alone or in combination, do not teach or suggest the limitations of claims 8 and 9.

In view of the above, dependent claims 2-5, 8, and 9 are not taught or suggested by Williams and Piot, either alone, or in combination. The Applicant respectfully traverses the rejection of claims 2-5, 8, and 9, and reconsideration and allowance of claims 2-5, 8, and 9 is respectfully requested.

Independent claim 10 includes the limitation “outputting movement data in a serial format from the electronic chip based on the generated motion data”. The Examiner stated that “[a]s to claim 10, this claim differs from claim 1 in that claim 1 is apparatus whereas claim 10 is method. Thus, method claim 10 is met by Williams in view of Piot.” (Final Office Action at para. no. 4, pages 3-4). As described above with respect to claim 1, there is no suggestion in the cited references to combine Williams and Piot, and even if the references are combined, they do not teach or suggest the limitations of claim 1. For the reasons set forth above with respect to claim 1, the combination of Williams and Piot also does not teach or suggest the limitations of claim 10, including the limitations “digitizing output values of

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the photo detectors with the electronic chip” and “outputting movement data in a serial format from the electronic chip based on the generated motion data”.

In view of the above, independent claim 10 is not taught or suggested by Williams and Piot, either alone, or in combination. The Applicant respectfully traverses the rejection of claim 10, and reconsideration and allowance of claim 10 is respectfully requested.

Dependent claims 11-13, and 15 further limit patentably distinct claim 10, and are believed to be allowable over the cited references. In addition, dependent claims 11-13, and 15, are further distinguishable over the cited references. For example, claim 13 includes the limitation “receiving button press information with the electronic chip, the button press information identifying a button coupled to the electronic chip that has been pressed; and outputting the button press information from the electronic chip in a serial format.” As described above with respect to claims 4 and 5, Williams and Piot include no teaching or suggestion regarding a chip that receives button press information, or outputs button press information. In view of the above, Williams and Piot, either alone or in combination, do not teach or suggest the limitations of claim 13.

Dependent claim 15 includes the limitation “outputting test information from the electronic chip in a serial format, the test information including results of internal tests performed by the electronic chip.” As described above with respect to claim 8, Williams and Piot include no teaching or suggestion regarding a chip that is configured to provide testing information. In view of the above, Williams and Piot, either alone or in combination, do not teach or suggest the limitations of claim 15.

In view of the above, dependent claims 11-13, and 15 are not taught or suggested by Williams and Piot, either alone, or in combination. The Applicant respectfully traverses the rejection of claims 11-13, and 15, and reconsideration and allowance of claims 11-13, and 15 is respectfully requested.

Independent claim 16 is directed to an electronic chip that includes “a serial interface coupled to the controller for outputting motion data based on the generated movement data in a serial format.” The Examiner stated that “[a]s to claim 16, this claim differs from claim 1 in that the limitation an alog (sic) to digital converter is additional (sic) recited.” (Final Office Action at para. no. 4, page 4). As described above with respect to claim 1, there is no suggestion in the cited references to combine Williams and Piot, and even if the references

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are combined, they do not teach or suggest the limitations of claim 1. For the reasons set forth above with respect to claim 1, the combination of Williams and Piot also does not teach or suggest the limitations of claim 16, including the limitations “an analog to digital converter coupled to the array of photo detectors for generating digital image data based on outputs of the photo detectors” and “a serial interface coupled to the controller for outputting motion data based on the generated movement data in a serial format.”

In view of the above, independent claim 16 is not taught or suggested by Williams and Piot, either alone, or in combination. The Applicant respectfully traverses the rejection of claim 16, and reconsideration and allowance of claim 16 is respectfully requested.

Dependent claims 17-19, 21, and 22, further limit patentably distinct claim 16, and are believed to be allowable over the cited references. In addition, dependent claims 17-19, 21, and 22, are further distinguishable over the cited references. For example, claim 19 includes the limitation “wherein the electronic chip is configured to receive button press information identifying a button that has been pressed on the apparatus, and wherein the electronic chip is configured to output the button press information in a serial format through the serial interface.” As described above with respect to claims 4 and 5, Williams and Piot include no teaching or suggestion regarding a chip that receives button press information, or outputs button press information. In view of the above, Williams and Piot, either alone or in combination, do not teach or suggest the limitations of claim 19.

Claim 22 includes the limitation “wherein the first set of movement data generated by the controller is also based on orientation information indicating a mounting orientation of the electronic chip within the apparatus.” As described above with respect to claim 9, Williams and Piot include no teaching or suggestion regarding a chip that is configured to receive orientation information. Williams and Piot also do not teach or suggest generating movement data based on orientation information as recited in claim 22. In view of the above, Williams and Piot, either alone or in combination, do not teach or suggest the limitations of claim 22.

In view of the above, dependent claims 17-19, 21, and 22 are not taught or suggested by Williams and Piot, either alone, or in combination. The Applicant respectfully traverses the rejection of claims 17-19, 21, and 22, and reconsideration and allowance of claims 17-19, 21, and 22 is respectfully requested.

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The Examiner rejected Claims 6, 7, 14, and 20 under 35 U.S.C. §103(a) as being unpatentable over Williams in view of Piot, and further in view of Siddiqui, U.S. Patent No. 5,912,661 (“Siddiqui”). Claims 6, 7, 14, and 20 are each dependent on independent claim 1, 10, or 16. As described above, Williams and Piot do not teach or suggest the above-quoted limitations of claims 1, 10, and 16. Siddiqui also does not teach or suggest the above-quoted limitations of claim 1, 10, and 16, nor is there any suggestion to combine the cited references. In view of the above, dependent claims 6, 7, 14, and 20, which further limit patentably distinct claim 1, 10, or 16, are believed to be allowable over the cited references, either alone, or in combination.

In addition, claims 6, 7, 14, and 20 are further distinguishable over the cited references. Claim 6 includes the limitation “wherein the single chip is configured to receive Z wheel information indicative of movement of a Z wheel on the apparatus.” Claim 7 is dependent on claim 6 and includes the limitation “wherein the single chip is configured to output the Z wheel information in a serial format through the serial interface.” Claim 14 includes the limitation “receiving Z wheel information with the electronic chip, the Z wheel information indicative of movement of a Z wheel coupled to the electronic chip; and outputting the Z wheel information from the electronic chip in a serial format.” Claim 20 includes the limitation “wherein the electronic chip is configured to receive Z wheel information indicative of movement of a Z wheel on the apparatus, and wherein the electronic chip is configured to output the Z wheel information in a serial format through the serial interface.”

The Examiner acknowledged that William and Piot do not teach or suggest the limitations of claims 6, 7, 14, and 20, but stated that “it would have been obvious to one of ordinary skill in the art at the [time the] invention was made to have added the z wheel button as taught by Siddiqui to the input devic eof (sic) William as modified by Piot . . .” (Final Office Action at para. no. 5, page 5). However, claims 6, 7, 14, and 20 include limitations regarding a “chip,” such as receiving Z wheel information with the chip, and outputting Z wheel information from the chip in a serial format. Even if the z-wheel of Siddiqui were added to the input device of William as proposed by the Examiner, which there is no suggestion to do, there is still no teaching or suggestion in the cited references that the integrated circuit 124 of Williams could or should be modified to receive Z wheel

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information from such an added z-wheel. There is no suggestion to make such a modification, particularly in light of the fact that there is no teaching or suggestion in Williams regarding receiving any button press information with integrated circuit 124.

In view of the above, dependent claims 6, 7, 14, and 20 are not taught or suggested by Williams, Piot, and Siddiqui, either alone, or in combination. The Applicant respectfully traverses the rejection of claims 6, 7, 14, and 20, and reconsideration and allowance of claims 6, 7, 14, and 20 is respectfully requested.

**Examiner's Response to Applicant's Arguments**

In response to the Applicant's arguments, the Examiner made the following statements in the Final Office Action:

On page 7, first paragraph, Applicant argues that there is no suggestion to combine the references, the Examiner recognizes the obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, **both William and Piot teach an optical mouse**. Although William's processing techniques may differs (sic) from Piot's device, but **both Williams and Piot provide an optical detection system that detects movement of an optical pointing device relative to a surface**. (Final Office Action at para. no. 6, page 5) (emphasis added).

Saying that both Williams and Piot provide an optical detection system that detects movement of an optical pointing device relative to a surface is essentially repeating the statement that both Williams and Piot teach an optical mouse. An optical mouse detects movement of the mouse relative to a surface. However, the argument that both Williams and Piot disclose an optical mouse does not establish a *prima facie* case of obviousness, as there must also be a suggestion to combine these references in a manner that would produce the claimed invention. As described above, there is no such suggestion, and even if the references are combined, the combination does not teach or suggest each and every limitation of the claims.

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In response to the Applicant's arguments, the Examiner also made the following statements in the Final Office Action:

On page 7, second paragraph, Applicant argues that Williams includes no teaching or suggestion that the optical mouse disclosed therein could or should be modified to include a serial interface anywhere within the mouse. However, **Applicant simply argues the reference of Williams, but the rejection is over Williams in view of Piot.** Thus, while Williams does not mention a serial interface, but Piot clearly teaches a serial interface included in the mouse. Applicant also argues that Piot includes not (sic) teaching or suggestion that the line interface 660 could or should be cooperated (sic) into the same integrated circuit as microcontroller. **However, Piot also teaches that microcontroller (650) can be integrated by different modules such 620, 625 (see column 13, lines 45-54).** Piot also teaches that **microcontroller (650) can be integrated by different modules such 620, 625 (see column 13, lines 45-54).** Thus it would have been obvious that the microcontroller (650) can be integrated with the serial interface protocol (660) so as to reduce the size of the input device. (Final Office Action at para. no. 6, page 6) (emphasis added).

Applicant respectfully disagrees with the statement that "Applicant simply argues the reference of Williams . . ." Applicant addressed both references in detail in the previously filed Response, and indicated how neither reference provides a teaching or suggestion to make the combination proposed by the Examiner. The Examiner stated "[t]hus, while Williams does not mention a serial interface, but Piot clearly teaches a serial interface included in the mouse." Simply arguing that Piot's mouse includes a serial interface does not establish that there is some teaching or suggestion to modify Williams to include a serial interface. There is no teaching or suggestion in Williams that the optical mouse disclosed therein could or should be modified to include a serial interface anywhere within the mouse, let alone that a serial interface could or should be incorporated into the integrated circuit 124. There is no teaching or suggestion in Piot that the line interface 660 disclosed therein could or should be used in place of an output system that outputs x and y pulse train outputs with the direction and speed of the motion contained in the phase shift and frequency of the output signals, such as the output system disclosed in Williams. There is also no teaching or suggestion in Piot that the line interface 660 disclosed there could or should be incorporated into any integrated circuit, let alone an integrated circuit like that disclosed in Williams.

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As shown in the above block quote, the Examiner makes the statement (twice) that “Piot also teaches that microcontroller (650) can be integrated by different modules such 620, 625 (see column 13, lines 45-54).” Applicant respectfully disagrees with this statement. Piot does not disclose that microcontroller 650 can be integrated by “different modules,” and Piot does disclose that microcontroller 650 can be integrated by different modules “such [as]” 620, 625. Rather, the portion of Piot cited by the Examiner discloses the following:

It is noted that the photosensor arrays 320, microcontroller 650, and cross-correlation modules 620, 625 may be integrated on a single complementary metal oxide semiconductor integrated circuit using a conventional digital signal processing (“DSP”) core. In an alternative embodiment, **these elements** may be built using discrete integrated circuits such as a microcontroller or DSP chips, for example. (emphasis added).

Thus, Piot discloses that elements 320, 620, 625, and 650 may be integrated on a single integrated circuit, or “these elements” may be built using discrete integrated circuits. Piot includes no teaching or suggestion regarding integrating line interface 660 with microcontroller 650 as proposed by the Examiner, or with any other element.

In response to the Applicant’s arguments, the Examiner also made the following statements in the Final Office Action:

Moreover, the use of a one piece construction instead of the structure disclosed in Williams and Piot would be merely a matter of obvious engineering choice. *In re Larson*, 144 USPQ 347 (CCPA 1965); *In re Fridolph*, 50 CCPA 745 89 F.2d 509, 135 USPQ 319. The unification or integration involve more than mere depending more upon the choice of the manufacturer, and the convenience and availability of the machine and tools necessary to construct the device. *In re Lockhart*, 90 USPQ 214 (CCPA 1951); *In re Murray*, 19 CCPA (Patents) 739, 53 F.2d 541, 11 USPQ 155; *In re Zabel et al.*; CCPA (Patents) 832, 186 F.2d 735, 88 USPQ 367. (Final Office Action at para. no. 6, page 6).

The MPEP specifies that “[i]f the facts in a prior legal decision are sufficiently similar to those in an application under examination, the examiner may use the rationale used by the court. If the applicant has demonstrated the criticality of a specific limitation, it would not be appropriate to rely solely on case law as the rationale to support an obviousness rejection.” MPEP § 2144 (emphasis in original). The facts of the cases cited by the Examiner are quite different from the facts of the present case. In addition, it is inappropriate to rely solely on

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such cases as the rationale to support the Examiner's obviousness rejection. Since there is no suggestion to combine the cited references, and even if combined, the references do not teach or suggest each and every limitation of the claims, it would be inappropriate to rely solely on the cited cases to support the Examiner's rejection.

In view of the above, claims 1-22 are not taught or suggested by the cited references, either alone, or in combination. The Applicant respectfully traverses the rejection of claims 1-22, and reconsideration and allowance of claims 1-22 is respectfully requested.

**Allowable Subject Matter**

In light of the above, Applicant believes independent claims 1, 10, and 16, and the claims depending therefrom, are in condition for allowance. Allowance of these claims is respectfully requested.

**CONCLUSION**

Any inquiry regarding this Amendment and Response should be directed to Jeff A. Holmen at the below-listed telephone number or Pamela Lau Kee at Telephone No. (408) 553-3059, Facsimile No. (408) 553-3063. In addition, all correspondence should continue to be directed to the following address:

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Respectfully submitted,

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**CERTIFICATE UNDER 37 C.F.R. 1.8:**

The undersigned hereby certifies that this paper or papers, as described herein, are being deposited in the United States Postal Service, as first class mail, in an envelope address to: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 29<sup>th</sup> day of March, 2004.

By Jeff A. Holmen  
Name: Jeff A. Holmen

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